

## ***Interactive comment on “An assessment of natural methane fluxes simulated by the CLASS-CTEM model” by Vivek K. et al.***

### **Anonymous Referee #2**

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The manuscript deals with an assessments of natural methane emission from wetlands and fire and soil uptake simulated by a one box model. The paper contains some interesting material, is reasonably well written and is generally well referenced. But the number of figures and tables is too high, some figures should be moved to the Supplement. In summary, the manuscript might be published after major revision.

### **Specific comments**

Line 41 - ...reasonably well with observation based estimates. Could you give any estimations for errors and obtained methane emissions in the Abstract.

Line 58-80 – Remove. Contents is not typical for research article.

Line 88, 91,94 etc – Remove brackets at [CO<sub>2</sub>].

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Line 98 – Give a reference to a paper where CH<sub>4</sub> concentration values were obtained.

Line 100 – Global warming potential usually is calculated over a specific time interval. According to IPCC 2013 CH<sub>4</sub> GWP is 7.6 – 72 times higher than CO<sub>2</sub> GWP, and other GHG (N<sub>2</sub>O, CF<sub>4</sub>, HFC-134a) have higher GWP than CH<sub>4</sub>.

Line 199 – CLASS model calculates the energy and water balance according to four PFT. None of them is related to wetlands. Is it correct to use upland vegetation types to simulate wetlands?

Line 243 -256 – Conception of seasonal changes in wetland extent needs more explanation. Wetland is a land area that is saturated with water (seasonally or permanently). According to figure 14a there is no wetlands in WSL in winter. It is not true. Seasonally frozen and covered by snow wetlands are still act as a source of methane (Langer et al., Biogeosciences, 12, 977-990, 2015 ; Korkiakoski et al, Biogeosciences, 14, 1947–1967, 2017). Details about wetland fraction computation and Table 1 can be moved to Supplementary.

Line 296 – Function regulating emission with soil moisture change should be evaluated in details. Melton et al. (2015) describe basic and alternative types of dependences of CO<sub>2</sub> heterotrophic respiration from soil moisture. Please give some proofs of applicability this kind of model for CH<sub>4</sub> emission.

Line 670-675 – Changes in methane emission from rice paddies due to land use changes and rapid agricultural development in East Asia should be mentioned.

Figures 1,2,7,8 can be abandoned or moved to Supplementary.

Figures 5,9,15 (also 6,10) can be joined in to two charts.

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